



## EMC COMPLIANCE TEST REPORT

for

### LCD Monitor

**Trade Name** : COMPAL; AG neovo  
**Model Number** : GM678; F-417  
**Serial Number** : N/A  
**Report Number** : 030355-E  
**Date** : April 29, 2003  
**Regulations** : See below

| Standards                                | Results (Pass/Fail) |
|--|---------------------|
| EN 55022: 1998                           | PASS                |
| EN 61000-3-2: 1995 + A1: 1998 + A2: 1998 | PASS                |
| EN 61000-3-3: 1995                       | PASS                |
| EN 55024: 1998                           | PASS                |
| - IEC 61000-4-2: 2001                    | PASS                |
| - IEC 61000-4-3: 1995                    | PASS                |
| - IEC 61000-4-4: 1995                    | PASS                |
| - IEC 61000-4-5: 1995                    | PASS                |
| - IEC 61000-4-6: 1996                    | PASS                |
| - IEC 61000-4-8: 1993                    | PASS                |
| - IEC 61000-4-11: 1994                   | PASS                |

Prepared for:

**Compal Electronics Inc.**  
**No. 581, Jui Kuang Rd., Neihu,**  
**Taipei, (114) Taiwan, R.O.C.**

Prepared by:



**C&C LABORATORY, CO., LTD.**  
**No. 81-1, 210 Lane, Pa-de 2<sup>nd</sup> Road, Lu-Chu Hsiang,**  
**Taoyuan, Taiwan, R.O.C.**  
TEL: (03) 324-0332  
FAX: (03) 324-5235



This report shall not be reproduced, except in full, without the written approval of  
C&C LABORATORY, CO., LTD.

The client to claim product certification, approval or endorsement by NVLAP, NIST or any agency  
of the federal government must not use this report.



## EC-Declaration of Conformity

For the following equipment:

LCD Monitor

---

( Product Name )

GM678; F-417 / COMPAL; AG neovo

---

( Model Designation / Trade name )

1.) Compal Electronics Inc.

2.) Compal Electronics (China) Co., Ltd.

---

( Manufacturer Name )

1.) No. 8, Nan-Tung Rd., Pin-Cheng City, Tao-Yuan Hsien, Taiwan, R.O.C.

2.) No. 988, Tung Fen East Rd., Economic & Technical Development Zone Kunshan, Jiangsun, P.R. China

---

( Manufacturer Address )

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive (89/336/EEC, Amended by 92/31/EEC, 93/68/EEC & 98/13/EC), For the evaluation regarding the Electromagnetic Compatibility (89/336/EEC, Amended by 92/31/EEC, 93/68/EEC & 98/13/EC), the following standards are applied:



EN 55022: 1998



EN 61000-3-2: 1995 + A1: 1998 + A2: 1998



EN 61000-3-3: 1995



EN 55024: 1998

IEC 61000-4-2: 2001; IEC 61000-4-3: 1995; IEC 61000-4-4: 1995;

IEC 61000-4-5: 1995; IEC 61000-4-6: 1996; IEC 61000-4-8: 1993; IEC 61000-4-11: 1994

The following manufacturer / importer or authorized representative established within the EUT is responsible for this declaration:

( Company Name )

---

( Company Address )

Person responsible for making this declaration:

( Name, Surname )

---

( Position / Title )

---

( Place )

( Date )

( Legal Signature )

## TABLE OF CONTENTS

|    |   |    |
|----|---|----|
| 1  | VERIFICATION OF COMPLIANCE .....  | 4  |
| 2  | GENERAL INFORMATION .....   | 5  |
| 3  | SYSTEM DESCRIPTION .....  | 6  |
| 4  | PRODUCT INFORMATION .....   | 7  |
| 5  | SUPPORT EQUIPMENT .....   | 8  |
| 6  | TEST FACILITY .....   | 9  |
| 7  | TEST EQUIPMENT LIST (EMISSION) .....  | 10 |
| 8  | TEST EQUIPMENT LIST (IMMUNITY) .....  | 11 |
| 9  | SECTION 1 EN 55022 (LINE CONDUCTED & RADIATED EMISSION) .....                                 | 12 |
|    | 9.1 MEASUREMENT PROCEDURE (PRELIMINARY LINE CONDUCTED EMISSION TEST) .....                    | 12 |
|    | 9.2 MEASUREMENT PROCEDURE (PRELIMINARY RADIATED EMISSION TEST) .....                          | 14 |
| 10 | BLOCK DIAGRAM OF TEST SETUP .....   | 16 |
| 11 | SUMMARY DATA .....  | 17 |
| 12 | SECTION 2 EN 61000-3-2 & EN 61000-3-3 (POWER HARMONICS & VOLTAGE FLUCTUATION / FLICKER) ..... | 20 |
| 13 | SECTION 3 IEC 61000-4-2 (ELECTROSTATIC DISCHARGE) .....                                       | 28 |
| 14 | SECTION 4 IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD) .....                                | 31 |
| 15 | SECTION 5 IEC 61000-4-4 (FAST TRANSIENTS/BURST) .....   | 34 |
| 16 | SECTION 6 IEC 61000-4-5 (SURGE IMMUNITY) .....  | 36 |
| 17 | SECTION 7 IEC 61000-4-6 (CONDUCTED DISTURBANCE/INDUCED RADIO-FREQUENCY FIELD) .....           | 38 |
| 18 | SECTION 8 IEC 61000-4-8 (POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST) .....                  | 40 |
| 19 | SECTION 9 IEC 61000-4-11 (VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS) .....     | 42 |
| 20 | APPENDIX 1 PHOTOGRAPHS OF TEST SETUP .....  | 44 |
|    | 20.1 LINE CONDUCTED EMISSION TEST (EN 55022) .....  | 45 |
|    | 20.2 RADIATED EMISSION TEST (EN 55022) .....  | 46 |
|    | 20.3 POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST (EN 61000-3-2, EN 61000-3-3) .....   | 47 |
|    | 20.4 ELECTROSTATIC DISCHARGE TEST (IEC 61000-4-2) .....                                       | 48 |
|    | 20.5 RADIATED ELECTROMAGNETIC FIELD (IEC 61000-4-3) .....                                     | 49 |
|    | 20.6 FAST TRANSIENTS/BURST TEST (IEC 61000-4-4) .....   | 50 |
|    | 20.7 SURGE IMMUNITY TEST (IEC 61000-4-5) .....  | 51 |
|    | 20.8 CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST (IEC 61000-4-6) .....      | 52 |
|    | 20.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (IEC 61000-4-8) .....                       | 53 |
|    | 20.10 VOLTAGE DIPS / INTERRUPTION TEST (IEC 61000-4-11) .....                                 | 54 |
| 21 | APPENDIX 2 PHOTOGRAPHS OF EUT .....   | 55 |

## 1 VERIFICATION OF COMPLIANCE

**Equipment Under Test:** LCD Monitor  
**Trade Name:** COMPAL; AG neovo  
**Model Number:** GM678; F-417  
**Serial Number:** N/A  
**Applicant:** **Compal Electronics Inc.**  
No. 581, Jui Kuang Rd., Neihu, Taipei, (114) Taiwan, R.O.C.  
**Manufacturer:** **1.) Compal Electronics Inc.**  
No. 8, Nan-Tung Rd., Pin-Cheng City, Tao-Yuan Hsien, Taiwan, R.O.C.  
**2.) Compal Electronics (China) Co., Ltd.**  
No. 988, Tung Fen East Rd., Economic & Technical Development Zone  
Kunshan, Jiangsun, P.R. China  
**Type of Test:** EMC Directive 89/336/EEC for CE Marking  
**Technical Standards:** EN 55022: 1998  
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998  
EN 61000-3-3: 1995  
EN 55024: 1998 (IEC 61000-4-2: 2001, IEC 61000-4-3: 1995,  
IEC 61000-4-4: 1995, IEC 61000-4-5: 1995,  
IEC 61000-4-6: 1996, IEC 61000-4-8: 1993,  
IEC 61000-4-11: 1994)  
**File Number:** 030355-E  
**Date of Test:** April 24 ~ 26, 2003  
**Deviation:** None  
**Condition of Test Sample:** Normal  
**Final Result:** Pass  
**Worst Data:** See below

| Test Item          | Freq. (MHz) | Measured Data | Margin (M $\mu$ C)         | Remark |
|--------------------|-------------|---------------|----------------------------|--------|
| Radiated Emission  | 179.76      | 27.7 (dB/m)   | -2.3 dB ( $\pm$ 3.3498 dB) |        |
| Conducted Emission | 0.155       | 42.3 (dB)     | -23.4dB ( $\pm$ 2.8104 dB) |        |

- The negative sign in Margin cell means under the specific limit.
- This test result traceable to national or international standards.

The above equipment was tested by C&C Laboratory Co., Ltd. for compliance with the requirements set forth in EMC Directive 89/336/EEC and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

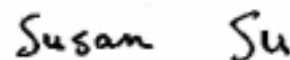
The test results of this report relate only to the tested sample identified in this report.

Approved by:



Jonson Lee / EMC Director

Reviewed by:



Susan Su / Section Manager

## 2 GENERAL INFORMATION

**Applicant:** **Compal Electronics Inc.**  
No. 581, Jui Kuang Rd., Neihu, Taipei, (114) Taiwan, R.O.C.

**Contact Person:** Wilson Pan

**Manufacturer:** **1). Compal Electronics Inc.**  
No. 8, Nan-Tung Rd., Pin-Cheng City, Tao-Yuan Hsien, Taiwan, R.O.C.  
**2). Compal Electronics (China) Co., Ltd.**  
No. 988, Tung Fen East Rd., Economic & Technical Development Zone  
Kunshan, Jiangsun, P.R. China

**File Number:** 030355-E

**Date of Test:** April 24 ~ 26, 2003

**Equipment Under Test:** LCD Monitor

**Model Number:** GM678; F-417

**Serial Number:** N/A

**Type of Test:** EMC Directive 89/336/EEC for CE Marking

**Technical Standards:** EN 55022: 1998  
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998  
EN 61000-3-3: 1995  
EN 55024: 1998 (IEC 61000-4-2: 2001, IEC 61000-4-3: 1995,  
IEC 61000-4-4: 1995, IEC 61000-4-5: 1995,  
IEC 61000-4-6: 1996, IEC 61000-4-8: 1993,  
IEC 61000-4-11: 1994)

**Frequency Range (EN 55022):** 150kHz to 30MHz for Line Conducted Test  
30MHz to 1000MHz for Radiated Emission Test

**Test Site:** **C&C LABORATORY CO., LTD.**  
No. 81-1, 210 Lane, Pa-de 2<sup>nd</sup> Road, Lu-Chu Hsiang,  
Taoyuan, Taiwan, R.O.C.



### **3 SYSTEM DESCRIPTION**

#### **EUT Test Program:**

1. EMI test program was loaded and executed in Windows 98 mode.
2. Data was sent to EUT filling the screen with upper case of “H” patterns.
3. Test program sequentially exercised printer and modem, then sent “H” patterns to them individually.
4. Repeat 2 to 3. Test program is self-repeating throughout the test.

## 4 PRODUCT INFORMATION

**Housing Type:** Plastic

**EUT Power Rating:** 100~240VAC, 50 / 60Hz

**AC power during Test:** 230VAC/ 50Hz

**AC Power Cord Type:** Unshielded, 1.8m (Detachable)

**OSC/Clock Frequencies:** 14.318MHz

**LCD Panel Manufacturer:** Hyundai      **Model:** HT17E12-200

**Power Board Manufacturer:** COMPAL      **Model:** VP-719

**Main Board Manufacturer:** COMPAL      **Model:** VL-720

**Key Board Manufacturer:** COMPAL      **Model:** VK-718

**VGA Cable Type:** Shielded, 1.8m (Non-detachable) with two cores

### I/O Port of EUT

| I/O Port Type            | Q'TY | Tested with |
|--------------------------|------|-------------|
| 1). Video Out Port (VGA) | 1    | 1           |

Note: The differences between of two model numbers (list on this report) are identical, just for marketing purpose only.



## 5 SUPPORT EQUIPMENT

| No. | Equipment     | Model #            | Serial #       | FCC ID     | Trade Name           | Data Cable     | Power Cord       |
|-----|---------------|--------------------|----------------|------------|----------------------|----------------|------------------|
| 1.  | PC            | EVO D300           | 6K1BKF83F18F   | FCC DoC    | Compaq               | N/A            | Unshielded, 1.8m |
| 2.  | Modem         | 2400               | 94-364-176277  | DK467GSM24 | Computer Peripherals | Shielded, 1.8m | Unshielded, 1.8m |
| 3.  | Printer       | EPSON STYLUS C20SX | DW4E130540     | FCC DoC    | EPSON                | Shielded, 1.8m | Unshielded, 1.8m |
| 4.  | PS/2 Keyboard | SK-2800C           | B1C790BCPJCN6L | GYUR79SK   | Compaq               | Shielded, 1.8m | N/A              |
| 5.  | PS/2 Mouse    | M-CAA43            | LZA11750827    | FCC DoC    | Logitech             | Shielded, 1.8m | N/A              |

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.



## 6 TEST FACILITY

- Location:** No. 81-1, 210 Lane, Pa-de 2<sup>nd</sup> Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R. O. C.
- Description:** There are four 3/10m open area test sites and three line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2001 and CISPR 16 requirements.
- Site Filing:** A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
- Registration also was made with Voluntary Control Council for Interference (VCCI).
- Site Accreditation:** Accredited by NEMKO (Authorization #: ELA 124) for EMC & A2LA (Certificate #: 824.01) for Emission
- Accredited by NVLAP (Certificate #: 200600-0)
- Also accredited by BSMI for the product category of Information Technology Equipment.
- Instrument Tolerance:** All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.
- Ground Plane:** Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

**Site # 3 & # 4 Line Conducted Test Site:** At Shielding Room

## 7 TEST EQUIPMENT LIST (EMISSION)

**Instrumentation:** The following list contains equipment used at C & C Laboratory, Co., Ltd. for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2-1988 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 9kHz to 1.0 / 2.0 GHz.

**Equipment used during the tests:**

**Open Area Test Site:** # 1

| Open Area Test Site # 1 |         |              |               |            |            |
|-------------------------|---------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE          | MFR     | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL. DUE   |
| Spectrum Analyzer       | HP      | 8568B        | 3001A05004    | 07/03/2002 | 07/02/2003 |
| S.P.A Display           | HP      | 85662A       | 3014A18846    | 07/03/2002 | 07/02/2003 |
| Q.P Adaptor             | HP      | 85650A       | 2811A01399    | 07/03/2002 | 07/02/2003 |
| RF Pre-selector         | HP      | 85685A       | 2947A01064    | 07/03/2002 | 07/02/2003 |
| Spectrum Analyzer       | Anritsu | MS2601A      | MT09950       | N/A        | N/A        |
| Pre-Amplifier           | HP      | 8447D        | 2944A08432    | N/A        | N/A        |
| Bilog Antenna           | CHASE   | CBL6112A     | 2309          | 02/28/2003 | 02/27/2004 |
| Turn Table              | EMCO    | 2081-1.21    | N/A           | N.C.R      | N.C.R      |
| Antenna Tower           | EMCO    | 2075-2       | 9707-2604     | N.C.R      | N.C.R      |
| Controller              | EMCO    | 2090         | N/A           | N.C.R      | N.C.R      |
| RF Switch               | ANRITSU | MP59B        | M54367        | N.C.R      | N.C.R      |
| Site NSA                | C&C     | N/A          | N/A           | 08/31/2002 | 08/30/2003 |

**Conducted Emission Test Site:** # 3

| Conducted Emission Test Site # 3 |      |              |               |            |            |
|----------------------------------|------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE                   | MFR  | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL. DUE   |
| EMI Test Receiver                | R&S  | ESHS30       | 828144/003    | 08/08/2002 | 08/07/2003 |
| LISN                             | R&S  | ENV 4200     | 830326/016    | 03/05/2003 | 03/04/2004 |
| LISN                             | EMCO | 3825/2       | 9003/1382     | 02/26/2003 | 02/25/2004 |

**Power Harmonic & Voltage Fluctuation/Flicker Measurement:**

| Power Harmonic & Voltage Fluctuation/Flicker Measurement (61000-3-2&-3-3) |                |              |               |            |            |
|---|----------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE  | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Harmonic & Flicker Tester   | HAEFELY TRENCH | PHF555       | 080 419-25    | 10/14/2002 | 10/13/2003 |

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

## 8 TEST EQUIPMENT LIST (IMMUNITY)

| ESD test (61000-4-2)   |                |              |               |            |            |
|--|----------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| ESD Generator  | EM TEST        | P30C-RFCI    | 0603-011      | 02/27/2003 | 02/26/2004 |
| Radiated Electromagnetic Field immunity Measurement (61000-4-3)                  |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| S.G.   | R&S            | SMY02        | 100094        | 08/08/2002 | 08/07/2003 |
| Power Amplifier  | ar             | 150W1000     | 300300        | N/A        | N/A        |
| Power Antenna  | EMCO           | 93141        | 9712-1083     | N/A        | N/A        |
| EM PROBE   | GW             | EMR-30       | L-0013        | 05/23/2002 | 05/22/2003 |
| Fast Transients/Burst test (61000-4-4)   |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Fast Transients/Burst Generator  | HAEFELY TRENCH | PEFT- JUNIOR | 583 333-117   | 08/22/2002 | 08/21/2003 |
| Surge Immunity test (61000-4-5)  |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Surge Tester   | HAEFELY TRENCH | PSUGER 4010  | 583 334-71    | 09/03/2002 | 09/02/2003 |
| CS test (61000-4-6)  |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| S.G.   | R&S            | SMY02        | 100094        | 08/08/2002 | 08/07/2003 |
| Power Amplifier  | ar             | 500A100A     | 300299        | N/A        | N/A        |
| CDN  | Lüthi          | 801-M3       | 1879          | 02/26/2003 | 02/25/2004 |
| CDN  | MEB            | M2           | A3002010      | 04/24/2002 | 04/23/2003 |
| Power Frequency Magnetic Field Immunity test (61000-4-8)                         |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| TRIAX ELF Magnetic Field Meter   | F.W.BELL       | 4090         | 9711          | 10/21/2002 | 10/20/2003 |
| Magnetic Field Tester  | HAEFELY TRENCH | MAG 100.1    | 080 938-01    | N/A        | N/A        |
| Voltage Dips/Short Interruption and Voltage Variation Immunity test (61000-4-11) |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Dips/Interruption and Variations Simulator                                       | HAEFELY TRENCH | PLINE 1610   | 080 344-05    | 03/28/2003 | 03/27/2004 |

## 9 SECTION 1 EN 55022 (LINE CONDUCTED & RADIATED EMISSION)

### 9.1 MEASUREMENT PROCEDURE (PRELIMINARY LINE CONDUCTED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipment received power from a second LISN supplying power of 110VAC/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode(s) were scanned during the preliminary test:

**Mode(s):**

- 1. 1280 × 1024 Resolution 75Hz**
- 2. 1024 × 768 Resolution 75Hz**
- 3. 800 × 600 Resolution 75Hz**

- 10) After the preliminary scan, we found the following test mode producing the highest emission level.

**Mode: 1.**

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

## MEASUREMENT PROCEDURE (FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 10 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Q.P. mode, then the emission signal was re-checked using an A.V. detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

### Data Sample:

| Freq.<br>MHz | Q.P.<br>Raw<br>dBuV | Average<br>Raw<br>dBuV | Q.P.<br>Limit<br>dBuV | Average<br>Limit<br>dBuV | Q.P.<br>Margin<br>dB | Average<br>Margin<br>dB | Note |
|--------------|---------------------|------------------------|-----------------------|--------------------------|----------------------|-------------------------|------|
| x.xx         | 43.95               | ---                    | 56                    | 46                       | -12.05               | ---                     | L1   |

|            |  |
|------------|--|
| Freq.      | = Emission frequency in MHz  |
| Raw dBuV   | = Uncorrected Analyzer/Receiver reading +<br>Insertion loss of LISN, if it > 0.5 dB                                  |
| Limit dBuV | = Limit stated in standard   |
| Margin dB  | = Reading in reference to limit  |
| Note       | = Current carrying line of reading   |
| “---“      | = The emission level complied with the Average<br>limits, with at least 2dB margin limits, so no<br>further recheck. |

### Calculation example:

$$\text{Margin (dB)} = \text{RAW (dBuV)} - \text{Limit (dBuV)}$$

## LINE CONDUCTED EMISSION LIMIT (EN 55022)

| Frequency     | Maximum RF Line Voltage |           |
|---------------|-------------------------|-----------|
|               | Q.P.                    | AVERAGE   |
| 150kHz-500kHz | 66-56dBuV               | 56-46dBuV |
| 500kHz-5MHz   | 56dBuV                  | 46dBuV    |
| 5MHz-30MHz    | 60dBuV                  | 50dBuV    |

**Note:** The lower limit shall apply at the transition frequency.

## 9.2 MEASUREMENT PROCEDURE (PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power source from the outlet socket under the turntable. All support equipment received 110VAC/60Hz power from another socket under the turntable, if any.
- 5) The antenna was placed at 10 meter away from the EUT as stated in EN 55022. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
- 6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test mode(s) were scanned during the preliminary test:

**Mode(s):**

1. **1280 × 1024 Resolution 75Hz**
2. **1024 × 768 Resolution 75Hz**
3. **800 × 600 Resolution 75Hz**

- 8) After the preliminary scan, we found the following test mode producing the highest emission level.

**Mode: 1.**

Then, the EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for final testing.

## MEASUREMENT PROCEDURE (FINAL RADIATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- 2) The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

### Data Sample:

| Freq.<br>(MHz) | Raw<br>Data<br>(dBuV) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(dB) |
|----------------|-----------------------|-------------------------|-------------------------------|--------|----------------|
| xx.xx          | 14.0                  | 11.2                    | 26.2                          | 30     | -3.8           |

|                       |  |
|-----------------------|--|
| Freq.                 | = Emission frequency in MHz                    |
| Raw Data (dBuV)       | = Uncorrected Analyzer / Receiver reading      |
| Corr. Factor (dB)     | = Antenna factor + Cable loss – Amplifier gain |
| Emiss. Level (dBuV/m) | = Raw reading converted to dBuV/m and CF added |
| Limit (dBuV/m)        | = Limit stated in standard                     |
| Margin (dB)           | = Reading in reference to limit                |
| P                     | = Peak Reading                                 |
| Q                     | = Quasi-peak Reading                           |
| A                     | = Average Reading                              |

### Calculation example:

$$\text{Margin (dB)} = \text{Emiss. Level (dBuV/m)} - \text{Limits (dBuV/m)}$$

$$\text{Emission Level (dBuV/m)} = \text{Raw Data (dBuV)} + \text{Corr Factor (dB)}$$

## RADIATED EMISSION LIMIT

| Frequency<br>(MHz) | Distance<br>(m) | Maximum Field Strength Limit<br>(dBu V/m/ Q.P.) |
|--------------------|-----------------|---|
| 30-230             | 10              | 30  |
| 230-1000           | 10              | 37  |

**Note:** The lower limit shall apply at the transition frequency.

## 10 BLOCK DIAGRAM OF TEST SETUP

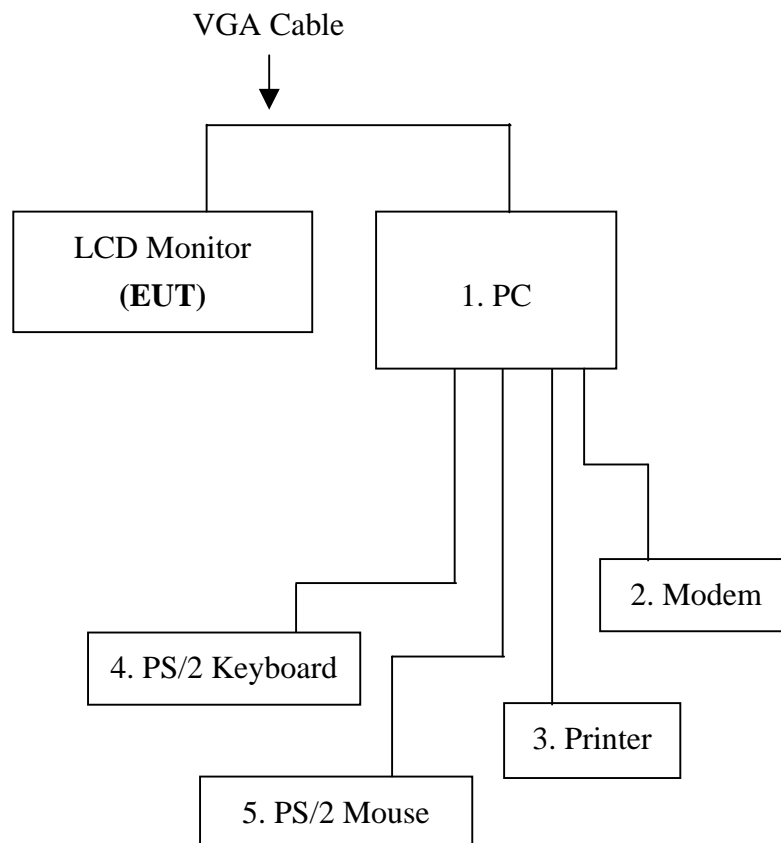
### System Diagram of Connections between EUT and Simulators

**EUT:** LCD Monitor

**Trade Name:** COMPAL

**Model Number:** GM678

**Power Cord:** Unshielded, 1.8m





## 11 SUMMARY DATA

### (LINE CONDUCTED TEST)

**Model Number:** GM678

**Location:** Site # 3

**Tested by:** Hank Huang

**Test Mode:** Mode 1

**Test Results:** Passed

**Temperature:** 20°C

**Humidity:** 65%RH

(The chart below shows the highest readings taken from the final data)

| FREQ<br>MHz | Q.P.<br>RAW<br>dBuV | AVG<br>RAW<br>dBuV | Q.P.<br>Limit<br>dBuV | AVG<br>Limit<br>dBuV | Q.P.<br>Margin<br>dB | AVG<br>Margin<br>dB | NOTE |
|-------------|---------------------|--------------------|-----------------------|----------------------|----------------------|---------------------|------|
| 0.155       | 41.00               | ---                | 65.70                 | 55.70                | -24.70               | ---                 | L1   |
| 2.301       | 32.40               | ---                | 56.00                 | 46.00                | -23.60               | ---                 | L1   |
| 2.433       | 30.20               | ---                | 56.00                 | 46.00                | -25.80               | ---                 | L1   |
| 17.448      | 31.60               | ---                | 60.00                 | 50.00                | -28.40               | ---                 | L1   |
| 18.369      | 34.00               | ---                | 60.00                 | 50.00                | -26.00               | ---                 | L1   |
| 19.350      | 31.40               | ---                | 60.00                 | 50.00                | -28.60               | ---                 | L1   |
| 0.155       | 42.30               | ---                | 65.70                 | 55.70                | -23.40               | ---                 | L2   |
| 2.172       | 32.10               | ---                | 56.00                 | 46.00                | -23.90               | ---                 | L2   |
| 2.435       | 31.00               | ---                | 56.00                 | 46.00                | -25.00               | ---                 | L2   |
| 6.307       | 26.50               | ---                | 60.00                 | 50.00                | -33.50               | ---                 | L2   |
| 9.150       | 26.20               | ---                | 60.00                 | 50.00                | -33.80               | ---                 | L2   |
| 25.843      | 25.70               | ---                | 60.00                 | 50.00                | -34.30               | ---                 | L2   |

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

**\*\*NOTE:** “---” denotes the emission level was or more than 2dB below the Average limit,  
so no re-check anymore.



## SUMMARY DATA

### (RADIATED EMISSION TEST)

**Model Number:** GM678

**Location:** Site # 1

**Tested by:** Hank Huang

**Polar:** Vertical--10m

**Test Mode:** Mode 1

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 21°C

**Humidity:** 65%RH

(The chart below shows the highest readings taken from the final data)

| Freq.<br>(MHz) | Raw<br>Data<br>(dBuV) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(dB) |
|----------------|-----------------------|-------------------------|-------------------------------|--------|----------------|
| 78.75          | 15.5                  | 6.8                     | 22.3                          | 30.0   | -7.7           |
| 157.29         | 16.3                  | 10.2                    | 26.5                          | 30.0   | -3.5           |
| 168.08         | 15.1                  | 10.5                    | 25.6                          | 30.0   | -4.4           |
| 179.76         | 16.2                  | 11.5                    | 27.7                          | 30.0   | -2.3           |
| 200.80         | 12.2                  | 10.8                    | 23.0                          | 30.0   | -7.0           |
| 315.15         | 18.1                  | 16.2                    | 34.3                          | 37.0   | -2.7           |
| 571.17         | 7.5                   | 22.3                    | 29.8                          | 37.0   | -7.2           |
| 614.42         | 10.6                  | 22.5                    | 33.1                          | 37.0   | -3.9           |



## SUMMARY DATA

### (RADIATED EMISSION TEST)

**Model Number:** GM678

**Location:** Site # 1

**Tested by:** Hank Huang

**Polar:** Horizontal--10m

**Test Mode:** Mode 1

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 21°C

**Humidity:** 65%RH

(The chart below shows the highest readings taken from the final data)

| Freq.<br>(MHz) | Raw<br>Data<br>(dBuV) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(dB) |
|----------------|-----------------------|-------------------------|-------------------------------|--------|----------------|
| 157.85         | 12.1                  | 10.1                    | 22.2                          | 30.0   | -7.8           |
| 189.54         | 9.6                   | 11.2                    | 20.8                          | 30.0   | -9.2           |
| 215.30         | 13.4                  | 10.5                    | 23.9                          | 30.0   | -6.1           |
| 271.80         | 11.8                  | 15.9                    | 27.7                          | 37.0   | -9.3           |
| 501.60         | 8.4                   | 21.2                    | 29.6                          | 37.0   | -7.4           |
| 577.20         | 6.2                   | 22.3                    | 28.5                          | 37.0   | -8.5           |
| 610.80         | 10.0                  | 22.4                    | 32.4                          | 37.0   | -4.6           |
| 865.60         | 5.1                   | 28.3                    | 33.4                          | 37.0   | -3.6           |

## 12 SECTION 2 EN 61000-3-2 & EN 61000-3-3 (POWER HARMONICS & VOLTAGE FLUCTUATION / FLICKER)

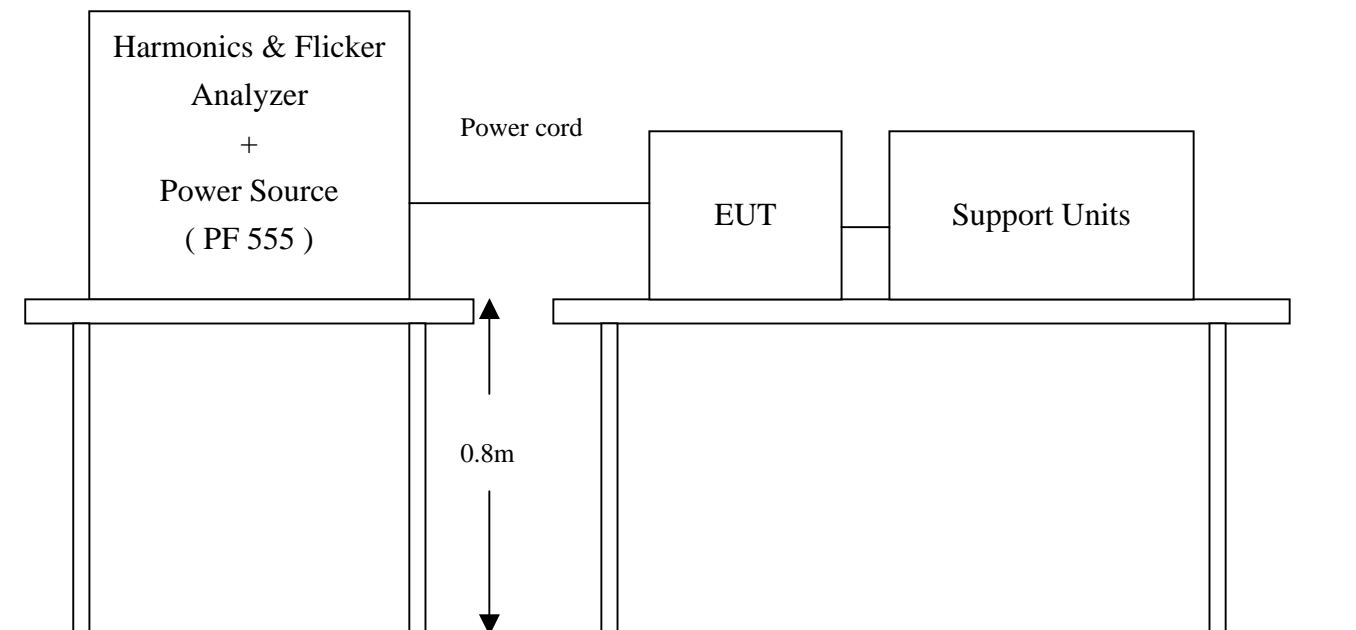
### POWER HARMONICS MEASUREMENT

**Port** : AC mains  
**Basic Standard** : EN 61000-3-2 (1995 + A1: 1998 + A2: 1998)  
**Limits** : ☒ CLASS A ; ☐ CLASS D  
**Tester** : Lung Tsai  
**Temperature** : 25°C  
**Humidity** : 51%

### VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

**Port** : AC mains  
**Basic Standard** : EN 61000-3-3 (1995)  
**Limits** : § 5 of EN 61000-3-3  
**Tester** : Lung Tsai  
**Temperature** : 25°C  
**Humidity** : 51%

### Block Diagram of Test Setup:



### Result:

Please see the attached test data.



-----  
EN 61000-3-2 TEST REPORT 2003/4/26 11:19 AM  
-----

Unit: LCD Monitor

Model No.: GM678

Remarks: Temp: 25°C Humid: 51%

Operator: Lung Tsai

=====

TEST SETUP

-----

|                  |           |               |              |
|------------------|-----------|---------------|--------------|
| Test Freq.:      | 50.00 Hz. | Test Voltage: | 230.0 vac    |
| Waveform :       | SINE      | Test Time:    | 2.5 min.     |
| Classification : | CLASS A   | Test Type:    | STEADY-STATE |

|                   |     |           |       |
|-------------------|-----|-----------|-------|
| Prog. Zo Enabled: | YES | Prog. Zo: | 0.000 |
|-------------------|-----|-----------|-------|

|  |        |
|--|--------|
| Motor Driven with Phase Angle Control: | NO     |
| Impedance selected:                    | DIRECT |

|                        |            |             |            |
|------------------------|------------|-------------|------------|
| Synthetic R+L Enabled: | NO         |             |            |
| Resistance:            | 0.380 Ohms | Inductance: | 460.000 uH |

MAX WATTS: 37.1W



TEST DATA

Result: PASS

Harmonic Current Results

| Hn | AMPS  | LO Limit | HI Limit | Result |
|----|-------|----------|----------|--------|
| 0  | 0.000 | 0.000    | 0.000    | PASS   |
| 1  | 0.162 | NaN      | NaN      | PASS   |
| 2  | 0.001 | 1.080    | 1.080    | PASS   |
| 3  | 0.134 | 2.300    | 2.300    | PASS   |
| 4  | 0.001 | 0.430    | 0.430    | PASS   |
| 5  | 0.121 | 1.140    | 1.140    | PASS   |
| 6  | 0.001 | 0.300    | 0.300    | PASS   |
| 7  | 0.109 | 0.770    | 0.770    | PASS   |
| 8  | 0.001 | 0.230    | 0.230    | PASS   |
| 9  | 0.094 | 0.400    | 0.400    | PASS   |
| 10 | 0.001 | 0.184    | 0.184    | PASS   |
| 11 | 0.078 | 0.330    | 0.330    | PASS   |
| 12 | 0.001 | 0.153    | 0.153    | PASS   |
| 13 | 0.061 | 0.210    | 0.210    | PASS   |
| 14 | 0.001 | 0.131    | 0.131    | PASS   |
| 15 | 0.044 | 0.150    | 0.150    | PASS   |
| 16 | 0.000 | 0.115    | 0.115    | PASS   |
| 17 | 0.029 | 0.132    | 0.132    | PASS   |
| 18 | 0.000 | 0.102    | 0.102    | PASS   |
| 19 | 0.017 | 0.118    | 0.118    | PASS   |
| 20 | 0.000 | 0.092    | 0.092    | PASS   |



|    |       |       |       |      |
|----|-------|-------|-------|------|
| 21 | 0.009 | 0.107 | 0.107 | PASS |
| 22 | 0.000 | 0.084 | 0.084 | PASS |
| 23 | 0.008 | 0.098 | 0.098 | PASS |
| 24 | 0.000 | 0.077 | 0.077 | PASS |
| 25 | 0.011 | 0.090 | 0.090 | PASS |
| 26 | 0.000 | 0.071 | 0.071 | PASS |
| 27 | 0.012 | 0.083 | 0.083 | PASS |
| 28 | 0.000 | 0.066 | 0.066 | PASS |
| 29 | 0.011 | 0.078 | 0.078 | PASS |
| 30 | 0.000 | 0.061 | 0.061 | PASS |
| 31 | 0.010 | 0.073 | 0.073 | PASS |
| 32 | 0.000 | 0.058 | 0.058 | PASS |
| 33 | 0.007 | 0.068 | 0.068 | PASS |
| 34 | 0.000 | 0.054 | 0.054 | PASS |
| 35 | 0.004 | 0.064 | 0.064 | PASS |
| 36 | 0.000 | 0.051 | 0.051 | PASS |
| 37 | 0.002 | 0.061 | 0.061 | PASS |
| 38 | 0.000 | 0.048 | 0.048 | PASS |
| 39 | 0.003 | 0.058 | 0.058 | PASS |
| 40 | 0.000 | 0.046 | 0.046 | PASS |

END OF REPORT



-----  
EN 61000-3-3 TEST REPORT 2003/4/26 11:34 AM  
-----

Unit: LCD Monitor

Model No.: GM678 (Continue)

Remarks: Temp: 25°C Humid: 51%

Operator: Lung Tsai

=====

TEST SETUP

-----

Test Freq.: 50.00 Hz. Test Voltage: 230.0 vac

Waveform : SINE

Test Time: 10.0 min. Tshort: 10.0 min.

Prog. Zo Enabled: YES Prog. Zo: 0.000

Voltage Change less than once per Hour: NO

Impedance selected: DIRECT

Synthetic R+L Enabled: NO

Resistance: 0.380 Ohms Inductance: 460.000 uH





TEST DATA

-----

Result: PASS

|           | EUT Data | Limit | Result | Test Enabled |
|-----------|----------|-------|--------|--------------|
| Pst max   | 0.001    | 1.00  | PASS   | true         |
| Plt max   | 0.001    | 0.65  | PASS   | true         |
| dc %      | 0.00     | 3.00  | PASS   | true         |
| dmax %    | 0.00     | 4.00  | PASS   | true         |
| d(t) sec. | 0.00     | 0.20  | PASS   | true         |

Power Source Data

|                |       |       |      |      |
|----------------|-------|-------|------|------|
| Source Pst max | 0.020 | 0.400 | PASS | true |
| % THD          | 0.03  | 3.00  | PASS | true |

END OF REPORT



-----  
EN 61000-3-3 TEST REPORT 2003/4/26 11: 47 PM  
-----

Unit: LCD Monitor

Model No.: GM678 (Manual Switch)

Remarks: Temp: 25°C Humid: 51%

Operator: Lung Tsai

=====

TEST SETUP

-----

Test Freq.: 50.00 Hz. Test Voltage: 230.0 vac

Waveform : SINE

Test Time: 10.0 min. Tshort: 10.0 min.

Prog. Zo Enabled: YES Prog. Zo: 0.000

Voltage Change less than once per Hour: NO

Impedance selected: DIRECT

Synthetic R+L Enabled: NO

Resistance: 0.380 Ohms Inductance: 460.000 uH



TEST DATA

-----

Result: PASS

|           | EUT Data | Limit | Result | Test Enabled |
|-----------|----------|-------|--------|--------------|
| Pst max   | 0.001    | 1.00  | PASS   | true         |
| Plt max   | 0.001    | 0.65  | PASS   | true         |
| dc %      | 0.00     | 3.00  | PASS   | true         |
| dmax %    | 0.00     | 4.00  | PASS   | true         |
| d(t) sec. | 0.00     | 0.20  | PASS   | true         |

Power Source Data

|                |       |       |      |      |
|----------------|-------|-------|------|------|
| Source Pst max | 0.020 | 0.400 | PASS | true |
| % THD          | 0.03  | 3.00  | PASS | true |

END OF REPORT

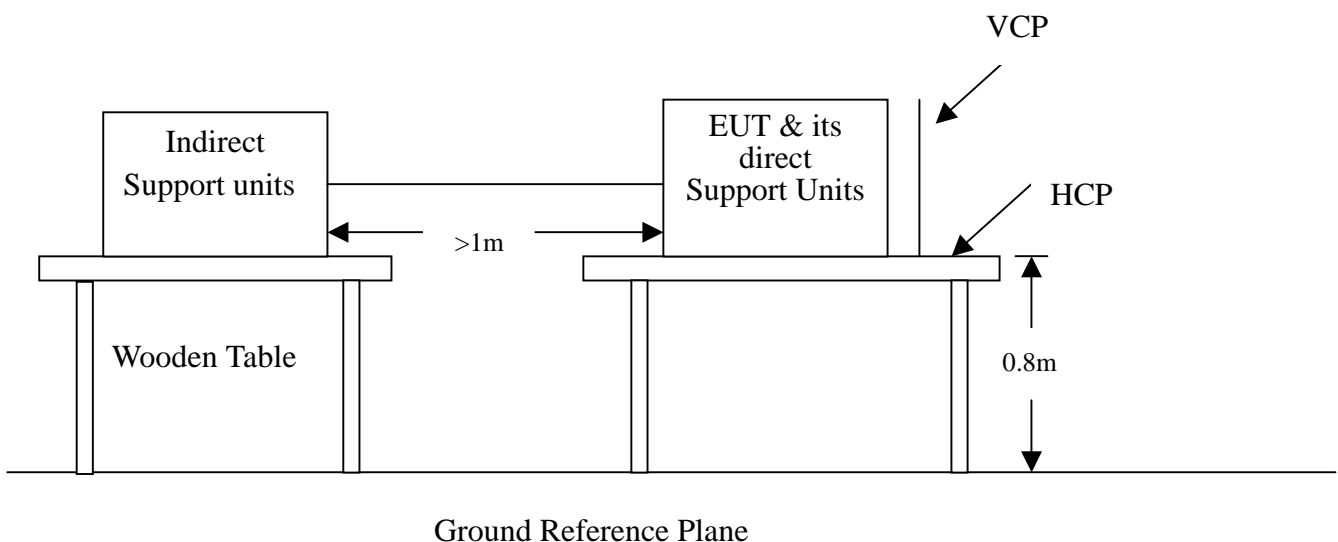
### 13 SECTION 3 IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)

#### ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

**Port** : Enclosure  
**Basic Standard** : IEC 61000-4-2  
**Test Level** :  $\pm 8$  kV (Air Discharge)  
                   $\pm 4$  kV (Contact Discharge)  
                   $\pm 4$  kV (Indirect Discharge)  
**Performance Criteria** : B (Standard Require)  
**Tester** : Lung Tsai  
**Temperature** :  $23^{\circ}\text{C}$   
**Humidity** : 46%  
**Pressure** : 1018mbar

#### Block Diagram of Test Setup:

( The 470 k ohm resistors are installed per standard requirement )



### **Test Procedure:**

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The indirect support units were located 1 m minimum away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
3. A scroll 'H' test program was loaded and executed in Windows 98 mode.
4. The Host PC sent above message to EUT and related peripherals through the test.
5. Active the communication function if the EUT with such port(s).
6. As per the requirement of EN 55024; applying direct contact discharge at the sides other than front of EUT at minimum 50 discharges (25 positive and 25 negative) if applicable, can't be applied direct contact discharge side of EUT then the indirect discharge shall be applied. One of the test points shall be subjected to at least 50 indirect discharge (contact) to the front edge of horizontal coupling plane.
7. Other parts of EUT where it is not possible to perform contact discharge then selecting appropriate points of EUT for air discharge, a minimum of 10 single air discharges shall be applied.
8. The application of ESD to the contact of open connectors is not required.
9. The EUT direct connection units also need to be applied ESD at the port of EUT cable connected.
10. Putting a mark on EUT to show tested points. The following test condition was followed during the tests.

**Note:** As per IEC 61000-4-2:2001, with two 470k bleed resistors cable is connected between the EUT and HCP during the test applicable for power ungrounded or battery operating unit only.

The electrostatic discharges were applied as follows:

| Amount of Discharges | Voltage    | Coupling                       | Result (Pass/Fail) |
|----------------------|------------|--------------------------------|--------------------|
| Mini 10 /Point       | $\pm 8$ kV | Air Discharge                  | Pass               |
| Mini 25 /Point       | $\pm 4$ kV | Contact Discharge              | Pass               |
| Mini 25 /Point       | $\pm 4$ kV | Indirect Discharge HCP (Front) | Pass               |
| Mini 25 /Point       | $\pm 4$ kV | Indirect Discharge VCP (Right) | Pass               |
| Mini 25 /Point       | $\pm 4$ kV | Indirect Discharge VCP (Left)  | Pass               |
| Mini 25 /Point       | $\pm 4$ kV | Indirect Discharge VCP (Back)  | N/A                |

**\*\*The tested points to EUT, please refer to attached page.**

(Blue arrow mark for Contact Discharge and red arrow mark for Air Discharge)

### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**      ☐ **FAILED**

**Observation: No any function degraded during the tests.**

*The Tested Points of EUT*

*Photo 1 of 2*



*Photo 2 of 2*

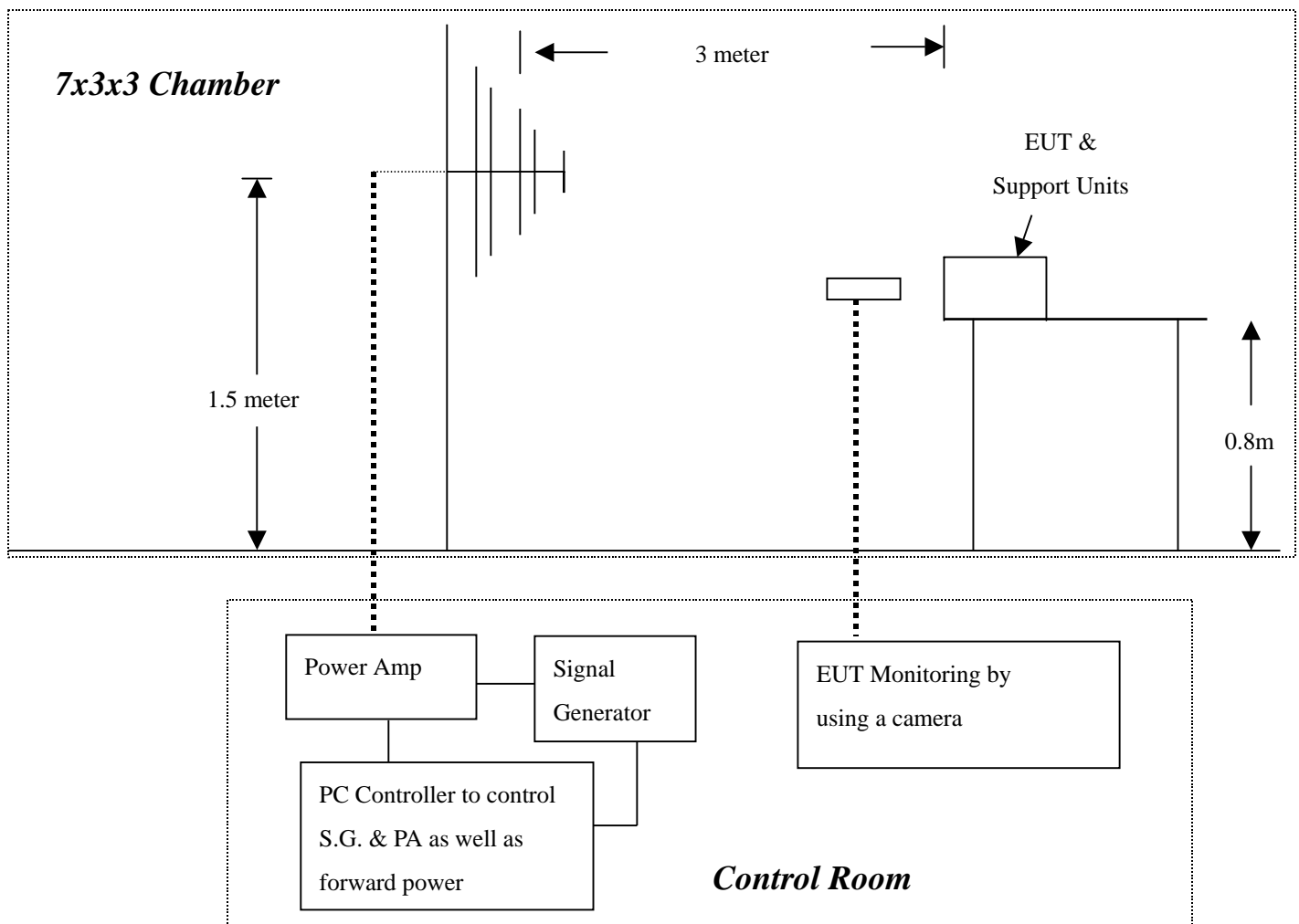


## 14 SECTION 4 IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD)

### RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

|                      |   |
|----------------------|---|
| Port                 | : Enclosure                             |
| Basic Standard       | : IEC 61000-4-3                         |
| Requirements         | : 3 V/m / with 80% AM. 1kHz Modulation. |
| Performance Criteria | : A (Standard Require)                  |
| Tester               | : Lung Tsai                             |
| Temperature          | : 23°C                                  |
| Humidity             | : 46%                                   |
| Pressure             | : 1018mbar                              |

#### Block Diagram of Test Setup:



## **Test Procedure:**

1. The EUT was located at the edge of supporting table keep 3 meter away from transmitting antenna, it just the calibrated square area of field uniformity. The support units were located outside of the uniformity area, but the cable(s) connected with EUT were exposed to the calibrated field as per IEC 61000-4-3.
2. A scroll 'H' messages were displayed on part of screen of EUT and an enlarged 'H' characters were displayed on the other part of screen of EUT.
3. Adjusting the monitoring camera to monitor the 'H' message as clear as possible.
4. Setting the testing parameters of RS test software per IEC 61000-4-3.
5. Performing the pre-test at each side of with double specified level (6V/m) at 4% steps.
6. From the result of pre-test in step 5, choice the worst side of EUT for final test from 80 MHz to 1000 MHz at 1% steps.
7. Recording the test result in following table.
8. It is not necessary to perform test as per annex A of EN 55024 if the EUT doesn't belong to ITE product.

### **IEC 61000-4-3 Preliminary test conditions:**

Test level : 6V/m  
Steps : 4 % of fundamental  
Dwell Time : 3 sec

| Range (MHz) | Field | Modulation | Polarity | Position (°) | Result (Pass/Fail) |
|-------------|-------|------------|----------|--------------|--------------------|
| 80-1000     | 6V/m  | Yes        | H        | Front        | Pass               |
| 80-1000     | 6V/m  | Yes        | V        | Front        | Pass               |
| 80-1000     | 6V/m  | Yes        | H        | Right        | Pass               |
| 80-1000     | 6V/m  | Yes        | V        | Right        | Pass               |
| 80-1000     | 6V/m  | Yes        | H        | Back         | Pass               |
| 80-1000     | 6V/m  | Yes        | V        | Back         | Pass               |
| 80-1000     | 6V/m  | Yes        | H        | Left         | Pass               |
| 80-1000     | 6V/m  | Yes        | V        | Left         | Pass               |

### **IEC 61000-4-3 Final test conditions:**

Test level : 3V/m  
Steps : 1 % of fundamental  
Dwell Time : 3 sec

| Range (MHz) | Field | Modulation | Polarity | Position (°) | Result (Pass/Fail) |
|-------------|-------|------------|----------|--------------|--------------------|
| 80-1000     | 3V/m  | Yes        | H        | Back         | Pass               |
| 80-1000     | 3V/m  | Yes        | V        | Back         | Pass               |





### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

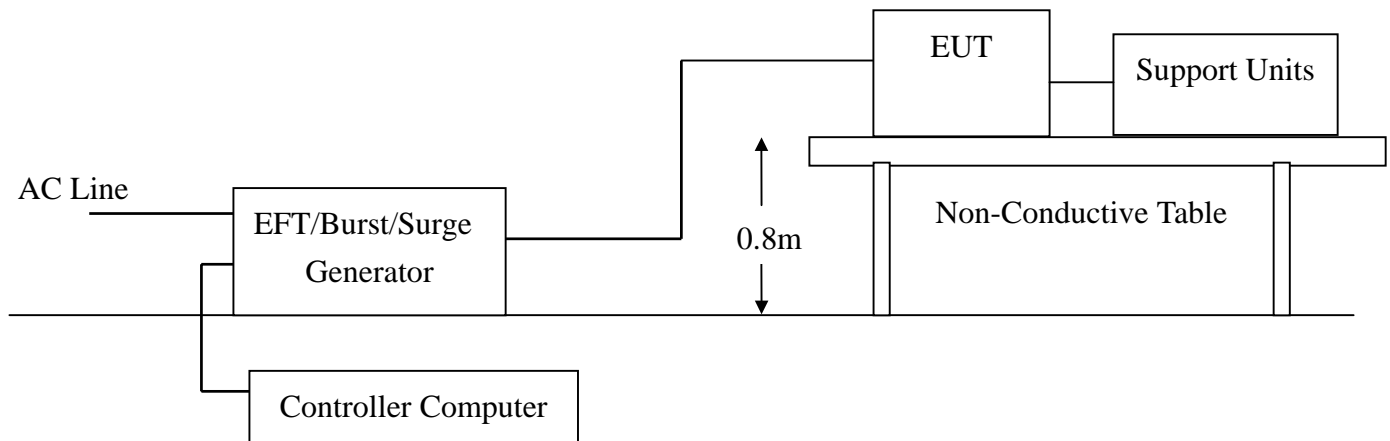
**Observation: No any function degraded during the tests.**

## 15 SECTION 5 IEC 61000-4-4 (FAST TRANSIENTS/BURST)

### FAST TRANSIENTS/BURST IMMUNITY TEST

|                      |                                    |
|----------------------|------------------------------------|
| Port                 | : On Power Supply Lines            |
| Basic Standard       | : IEC 61000-4-4                    |
| Requirements         | : $\pm 1$ kV for Power Supply Line |
| Performance Criteria | : B (Standard Require)             |
| Tester               | : Lung Tsai                        |
| Temperature          | : 23°C                             |
| Humidity             | : 46%                              |
| Pressure             | : 1018mbar                         |

#### Block Diagram of Test Setup:



### **Test Procedure:**

1. The EUT and support units were located on a wooden table 0.8 m away from ground reference plane.
2. A 1.0 meter long power cord was attached to EUT during the test.
3. The length of communication cable between communication port and clamp was keeping within 1 meter.
4. A test program was loaded and executed in Windows 98 mode.
5. The data was sent to EUT filling the screens with upper case of "H" patterns.
6. The test program exercised related support units sequentially.
7. Repeating step 3 to 6 through the test and increase test voltage to the EUT ports from minimum to standard request or client request.
8. Recording the test result as shown in following table.

### **Test conditions:**

Impulse Frequency : 5kHz

Tr/Th : 5/50ns

Burst Duration : 15ms

Burst Period : 3Hz

| Inject Line | Voltage kV | Inject Method | Result (Pass/Fail) |
|-------------|------------|---------------|--------------------|
| L           | $\pm 1$    | Direct        | Pass               |
| N           | $\pm 1$    | Direct        | Pass               |
| PE          | $\pm 1$    | Direct        | Pass               |
| L + N       | $\pm 1$    | Direct        | Pass               |
| L + PE      | $\pm 1$    | Direct        | Pass               |
| N + PE      | $\pm 1$    | Direct        | Pass               |
| L1 + N + PE | $\pm 1$    | Direct        | Pass               |

### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

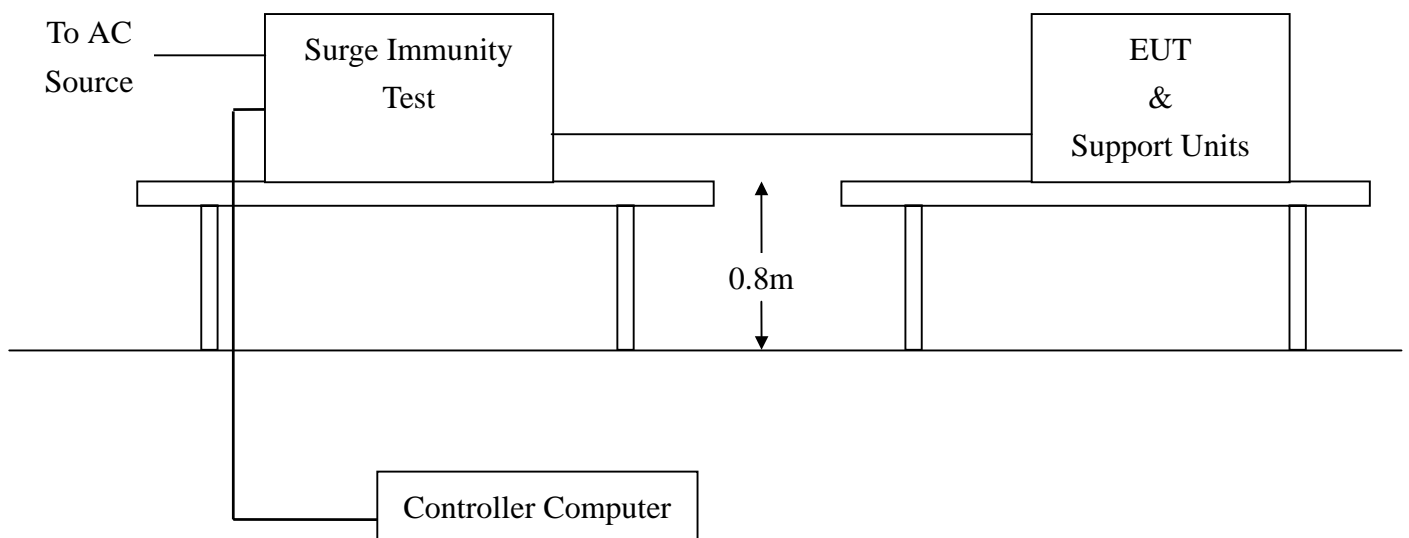
**Observation: No any function degraded during the tests.**

## 16 SECTION 6 IEC 61000-4-5 (SURGE IMMUNITY)

### SURGE IMMUNITY TEST

|                             |  |
|-----------------------------|--|
| <b>Port</b>                 | : Power Cord   |
| <b>Basic Standard</b>       | : IEC 61000-4-5  |
| <b>Requirements</b>         | : $\pm 1$ kV (Line to Line)<br>$\pm 2$ kV (Line to Ground) |
| <b>Performance Criteria</b> | : B (Standard Require)                                     |
| <b>Tester</b>               | : Lung Tsai  |
| <b>Temperature</b>          | : 23°C   |
| <b>Humidity</b>             | : 46%  |
| <b>Pressure</b>             | : 1018mbar   |

#### Block Diagram of Test Setup:



## **Test Procedure:**

1. The EUT and support units were located on a wooden table 0.8 m away from ground floor.
2. A test program was loaded and executed in Windows 98 mode.
3. The data was sent to EUT filling the screens with upper case of "H" patterns.
4. The test program exercised related support units sequentially.
5. Repeating step 3 to 4 through the test and increase test voltage to the EUT ports from minimum to standard request or client request.
6. Recording the test result as shown in following table.

### **Test conditions:**

Voltage Waveform : 1.2/50 *us*  
 Current Waveform : 8/20 *us*  
 Polarity : Positive/Negative  
 Phase angle : 0°, 90°, 270°  
 Number of Test : 5

| Coupling Line | Voltage (kV) | Polarity | Coupling Method | Result (Pass/Fail) |
|---------------|--------------|----------|-----------------|--------------------|
| L1-L2         | 1            | Positive | Capacitive      | Pass               |
| L1-PE         | 2            | Positive | Capacitive      | Pass               |
| L2-PE         | 2            | Positive | Capacitive      | Pass               |
| L1-L2         | 1            | Negative | Capacitive      | Pass               |
| L1-PE         | 2            | Negative | Capacitive      | Pass               |
| L2-PE         | 2            | Negative | Capacitive      | Pass               |

## **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

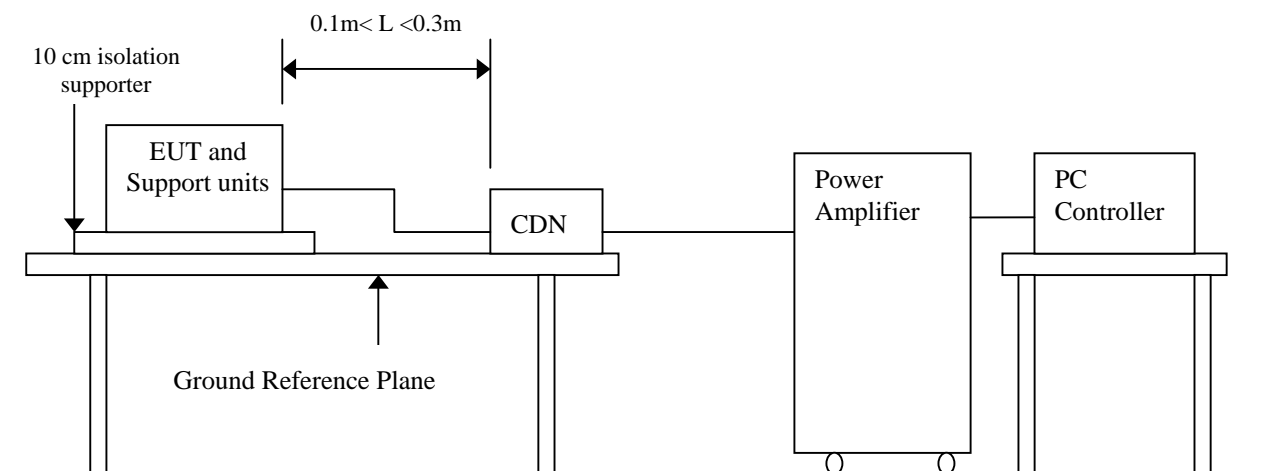
|  |
|--|
| <input checked="" type="checkbox"/> <b>PASS</b> <input type="checkbox"/> <b>FAILED</b> |
| <b>Observation: No any function degraded during the tests.</b>                         |

## 17 SECTION 7 IEC 61000-4-6 (CONDUCTED DISTRBANCE/INDUCED RADIO-FREQUENCY FIELD)

### CONDUCTED DISTRBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST

|                             |                                       |
|-----------------------------|---------------------------------------|
| <b>Port</b>                 | : AC Port                             |
| <b>Basic Standard</b>       | : IEC 61000-4-6                       |
| <b>Requirements</b>         | : 3 V / with 80% AM. 1kHz Modulation. |
| <b>Injection Method</b>     | : CDN-M3                              |
| <b>Performance Criteria</b> | : A (Standard Require)                |
| <b>Tester</b>               | : Lung Tsai                           |
| <b>Temperature</b>          | : 23°C                                |
| <b>Humidity</b>             | : 46%                                 |
| <b>Pressure</b>             | : 1018mbar                            |

### Block Diagram of Test Setup:



### **Test Procedure:**

1. The EUT and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
2. A 'H' messages were displayed on screen of EUT.
3. Adjusting the monitoring camera to monitor the 'H' message as clear as possible.
4. Setting the testing parameters of CS test software per IEC 61000-4-6.
5. Recording the test result in following table.

### **Test conditions:**

Frequency Range : 0.15MHz-80MHz

Frequency Step : 1% of fundamental

Dwell Time : 3 sec

| Range (MHz) | Field | Modulation | Result (Pass/Fail) |
|-------------|-------|------------|--------------------|
| 0.15-80     | 3V    | Yes        | Pass               |

### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

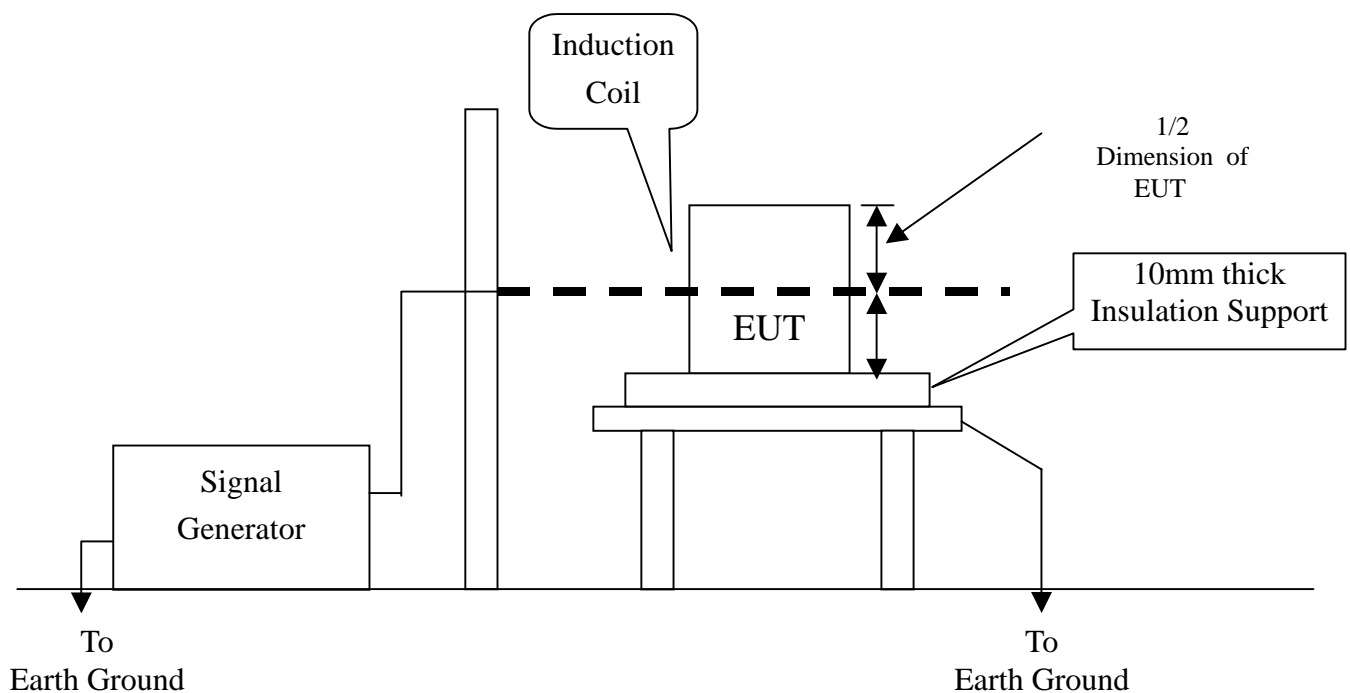
**Observation: No any function degraded during the tests.**

## 18 SECTION 8 IEC 61000-4-8 (POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST)

### POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

|                      |                        |
|----------------------|------------------------|
| Port                 | : Enclosure            |
| Basic Standard       | : IEC 61000-4-8        |
| Requirements         | : 1 A/m                |
| Performance Criteria | : A (Standard Require) |
| Tester               | : Lung Tsai            |
| Temperature          | : 23°C                 |
| Humidity             | : 46%                  |
| Pressure             | : 1018mbar             |

#### Block Diagram of Test Setup:





### **Test Procedure:**

1. The EUT and support units were located on Ground Reference Plane with the interposition of a 0.1 m thickness insulation support.
2. Putting the induction coil on horizontal direction.( X direction )
3. A test program was loaded and executed in Windows 98 mode.
4. The data was sent to the screen of EUT and filling the screen with upper case of “H” patterns.
5. The test program exercised related support units sequentially.
6. Repeating step 3 to 5 through the test.
7. Recording the test result as shown in following table.
8. Rotating the induction coil by 90° ( Y direction ) then repeat step 3 to 7.
9. Rotating the induction coil by 90° again ( Z direction ) then repeat step 3 to 7.

\*. Test conditions:

Field Strength: 1A/m  
Power Freq.: 50Hz  
Orientation: X, Y, Z

| Orientation | Field | Result (Pass/Fail) | Remark |
|-------------|-------|--------------------|--------|
| X           | 1A/m  | Pass               |        |
| Y           | 1A/m  | Pass               |        |
| Z           | 1A/m  | Pass               |        |

### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

**Observation: No any function degraded during the test.**

## 19 SECTION 9 IEC 61000-4-11 (VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS)

### VOLTAGE DIPS / SHORT INTERRUPTIONS

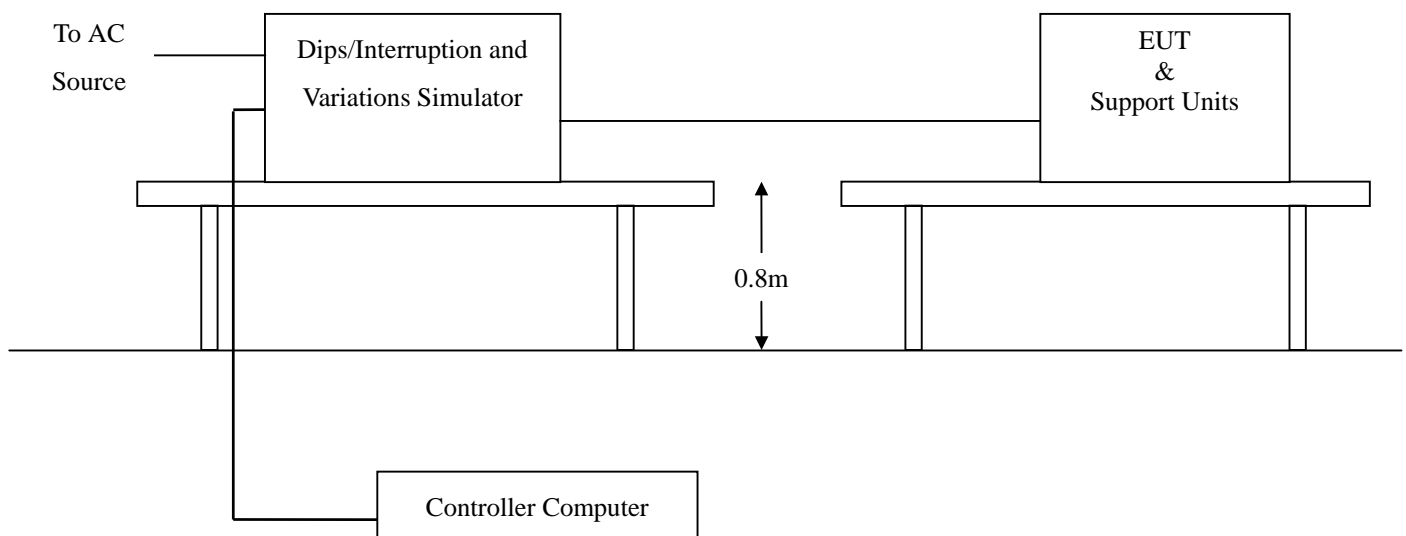
**Port** : AC mains  
**Basic Standard** : IEC 61000-4-11 (1994)  
**Requirement** : PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

| Voltage<br>Dips | Test Level<br>% $U_T$ | Reduction<br>(%) | Duration<br>( periods ) | Performance<br>Criteria |
|-----------------|-----------------------|------------------|-------------------------|-------------------------|
|                 | <5                    | >95              | 0.5                     | B                       |
|                 | 70                    | 30               | 25                      | C                       |

| Voltage<br>Interceptions | Test Level<br>% $U_T$ | Reduction<br>(%) | Duration<br>( periods ) | Performance<br>Criteria |
|--------------------------|-----------------------|------------------|-------------------------|-------------------------|
|                          | <5                    | >95              | 250                     | C                       |

**Test Interval** : Min. 10 sec.  
**Tester** : Lung Tsai  
**Temperature** : 23°C  
**Humidity** : 46%  
**Pressure** : 1018mbar

### Block Diagram of Test Setup:



### **Test Procedure:**

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. A test program was loaded and executed in Windows 98 mode.
3. The data was sent to EUT filling the screens with upper case of "H" patterns.
4. The test program exercised related support units sequentially.
5. Setting the parameter of tests and then Perform the test software of test simulator.
6. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
7. Repeating step 3 to 4 through the test.
8. Recording the test result in test record form.

### **Test conditions:**

The duration with a sequence of three dips/interruptions with interval of 10 s minimum  
( Between each test event )

### **Voltage Dips:**

| Test Level<br>% U <sub>T</sub> | Reduction<br>(%) | Duration<br>( periods ) | Observation | Meet Performance<br>Criteria |
|--------------------------------|------------------|-------------------------|-------------|------------------------------|
| 0                              | 100              | 0.5                     | Normal      | A                            |
| 70                             | 30               | 25                      | Normal      | A                            |

### **Voltage Interruptions:**

| Test Level<br>% U <sub>T</sub> | Reduction<br>(%) | Duration<br>( periods ) | Observation   | Meet Performance<br>Criteria |
|--------------------------------|------------------|-------------------------|---|------------------------------|
| 0                              | 100              | 250                     | EUT shut down, but can<br>be auto recovered as the<br>events disappear. | B                            |

**Normal:** No any functions degrade during and after the test.

### **Performance & Result:**

- Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

|  |  |
|--|--|
| <input checked="checked" type="checkbox"/> <b>PASS</b> | <input type="checkbox"/> <b>FAILED</b> |
|--|--|



## **20      APPENDIX 1    PHOTOGRAPHS OF TEST SETUP**

## 20.1 LINE CONDUCTED EMISSION TEST (EN 55022)

*Front View*



*Back View*



## 20.2 RADIATED EMISSION TEST (EN 55022)

*Front View*



*Back View*



## 20.3 POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST

(EN 61000-3-2, EN 61000-3-3)





## 20.4 ELECTROSTATIC DISCHARGE TEST (IEC 61000-4-2)





## 20.5 RADIATED ELECTROMAGNETIC FIELD (IEC 61000-4-3)



## 20.6 FAST TRANSIENTS/BURST TEST (IEC 61000-4-4)



## 20.7 SURGE IMMUNITY TEST (IEC 61000-4-5)



## 20.8 CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST (IEC 61000-4-6)



## 20.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (IEC 61000-4-8)



## 20.10 VOLTAGE DIPS / INTERRUPTION TEST (IEC 61000-4-11)





## **21    APPENDIX 2    PHOTOGRAPHS OF EUT**



*Front View of EUT*



*Back View of EUT*





*Left View of EUT*



*Right View of EUT*



***I/O Port of EUT***

